

TRAILING INTERSPECIFIC IMPATIENS

Field of Invention

The present invention relates to a novel trailing habit in interspecific impatiens plants.

- 5 The trailing impatiens plants of the present invention were developed through a unique interspecific cross between *Impatiens flaccida* and *Impatiens Hawkeri*.

- 10 This invention also relates to interspecific impatiens seed, interspecific impatiens plants, interspecific impatiens varieties and interspecific impatiens hybrids containing this trailing trait.

- 15 In addition, the present invention also relates to methods for transferring the trailing habit to New Guinea impatiens varieties using *Impatiens flaccida* in breeding as either a female or male parent, in order to produce novel types and varieties of interspecific impatiens plants which exhibit this trailing habit. The present invention also relates to a F₁ hybrid or later generation interspecific impatiens plant grown from the interspecific hybrid seed produced by the aforementioned methods.

Background of Invention

- 20 The genus *Impatiens* is comprised of about 500 species of annual or perennial herbs or subshrubs. They are widely distributed particularly in the tropics and subtropics of Asia and Africa (*Hortus Third A Concise Dictionary of Plants Cultivated in the United States and Canada*, MacMillan Publishing Company (1976)).

- 25 A species of particular commercial interest is *Impatiens Hawkeri*, commonly referred to as New Guinea impatiens. New Guinea impatiens have foliage and floral characteristics that are desirable for bedding and pot-plant use. Impatiens plants reported to be native to New Guinea were classified in 1886 as *Impatiens Hawkeri* (*New Guinea Impatiens, A Ball Guide*, edited by W. Banner and M. Klopmeier, Ball Publishing (1995)). Occasionally, these
30 early specimens were referred to as *Impatiens herzogii*. *Id.* In the early 1900's, botanists from Germany, England and the Netherlands explored parts of the Sundra Islands, and by

1915, nine New Guinea impatiens species were identified from this area: *I. dahlia*, *I. herzogii*, *I. laxterbachii*, *I. linearifolia*, *I. mooreana*, *I. polyphylla*, *I. rodatzii*, *I. schlechteri*, and *I. trichura*. *Id.* Taxonomically, the collections were confusing and were considered to be habitat variations of *I. herzogii* rather than new species by Von R. Schlechter. *Id.* In the most recent taxonomic classification, Grey-Wilson proposed that New Guinea impatiens belong to one highly variable species, *I. Hawkeri*, in which 15 groups were identified based on geographic location. *Id.*

Although diverse phenotypically, typically members of New Guinea impatiens are fertile when crossed with each other or when selfed and generally have a 2n chromosome number of 32 (T. Arisumi, *J. Hered.*, 64:77-79 (1973)). Breeding programs initiated in the early 1970's have led to the development of New Guinea impatiens cultivars that are adapted to a variety of light conditions, and have large flowers of a wide variety of colors including white, pink, red, orange, as well as biocolors (*New Guinea Impatiens, A Ball Guide*, edited by W. Banner and M. Klopmeier, Ball Publishing (1995)). Foliage types include slightly rounded to lanceolate with smooth to serrated edges having colors ranging from green to burgundy and variegated. *Id.* Plant habits are typically mounded to spreading (U.S. Plant Patent No. 5,921; U.S. Plant Patent No. 4720; U.S. Plant Patent No. 10,858). One cultivar 'Radiance' is described as having stems that are "slightly trailing" (U.S. Plant Patent 7,098).

Interspecific crosses using *Impatiens platypetala* and *Impatiens aurantiaca*, two species closely related to *Impatiens Hawkeri*, have been used in New Guinea impatiens cultivar improvement, but offspring of these crosses are often sterile (*New Guinea Impatiens, A Ball Guide*, edited by W. Banner and M. Klopmeier, Ball Publishing (1995)). Arisumi has successfully used ovule culture to recover interspecific hybrids of New Guinea impatiens, *I. Hawkeri*, crossed with *I. auricoma*, *I. niamniamensis*, *I. uguenensis*, and *I. Wallerana* (*I. sultani* in his publication) (T. Arisumi, *J. Amer. Soc. Hort. Sci.* 112(6):1026-1031 (1987)).

Impatiens flaccida alba, a species noted for drought tolerance, has been used in interspecific crosses. Using ovule culture, hybrid seedlings were recovered from interspecific

crosses of *I. flaccida alba* x *I. repens* and *I. uguenensis* x *I. flaccida alba*; however, no seedlings were recovered from crosses of *I. flaccida alba* x *I. herzogii*, *I. flaccida alba* x *I. epiphytica*, or *I. flaccida alba* x *I. hookeriana* (T. Arisumi, *J. Amer. Soc. Hort. Sci.* 105(5):629-631 (1980)). An additional study confirmed the previously reported *I. flaccida* 5 *alba* x *I. repens* and *I. uguenensis* x *I. flaccida alba* successes, while no seedlings were recovered from a cross between *I. flaccida alba* x 'Pele' (A New Guinea impatiens cultivar) (T. Arisumi, *J. Amer. Soc. Hort. Sci.* 110(2):273-276 (1985)). Interspecific hybrids were also recovered from a cross between *I. flaccida* x *I. Wallerana* 'Elfin White' (*I. sultani* in his publication) (T. Arisumi, *J. Amer. Soc. Hort. Sci.* 112(6):1026-1031 (1987)).

Summary of Invention

The present invention relates to interspecific impatiens plants having a novel trailing habit. The interspecific impatiens plants of the present invention possess a trailing habit and have pedigrees which include 2245B, 2257B or derivatives thereof.

The present invention also relates to seed, pollen, cuttings and ovules of the trailing interspecific impatiens plants of the present invention. Moreover, the present invention also relates to a tissue culture comprising regenerable cells of the trailing interspecific impatiens plants of the present invention.

Additionally, the present invention relates to interspecific impatiens seed which contain the trailing trait. The seed of the present invention have pedigrees which include 2245B, 2257B or derivatives thereof. The present invention also relates to a trailing interspecific impatiens plant produced by growing the seed of the present invention.

The present invention also relates to a method for transferring the trailing trait from *Impatiens flaccida* into *Impatiens Hawkeri*. The method involves crossing pollen from a first parent impatiens plant to a second parent impatiens plant and harvesting the resultant first generation (F₁) hybrid impatiens seed. One of the parent impatiens plants used in said method 30 must be an *Impatiens flaccida*. Additionally, the present invention relates to a first generation

(F₁) hybrid plant produced by growing the hybrid seed produced by said method.

Brief Description of the Figures

5 The file of this patent contains at least one drawing executed in color. Copies of this patent with color drawing(s) will be provided by the Patent and Trademark Office upon request and payment of the necessary fee.

Figure 1 shows a photograph of an *Impatiens flaccida* x *Impatiens Hawkeri* hybrid named 2245B of the present invention that is approximately 12 weeks old.

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Figure 2 shows a photograph of hybrid 2245B that is approximately 20 weeks old.

Figure 3 shows a photograph of an *Impatiens flaccida* x *Impatiens Hawkeri* hybrid named 2257B of the present invention that is approximately 12 weeks old.

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Detailed Description of the Invention

The interspecific impatiens plants of the present invention exhibit an unique trailing habit. This trailing habit was developed through a unique interspecific cross between *Impatiens flaccida* and *Impatiens Hawkeri*.

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As used herein, the term "trailing" means a plant habit wherein lateral branches of the plant extend over the container and grow toward the ground.

25 The previously unknown trailing interspecific impatiens plants of the present invention were discovered as a result of breeding and research efforts which were conducted in Linda Vista, Costa Rica. In 1996, a cross was made using a proprietary *Impatiens flaccida* Linda Vista breeding selection as the female parent. This selection exhibited very vigorous growth, small lavender flowers, good pollen and seed yield, and is early to flower with a spreading, loose habit. The male parent was a bulk of *Impatiens Hawkeri* pollen collected from the Java
30 Series F₁ hybrid New Guinea impatiens (developed by and commercially available from Pan

American Seed Company, 622 Town Road, West Chicago, IL 60185). The plants in this series have medium vigor with a bushy, well-branched habit. They have good pollen and seed yield, and are early to flower with abundant flower production. Pollen was collected from several plants having a variety of flower colors, and may have included orange, red, salmon, red/salmon bicolor, rose/lilac bicolor, lavender, cherry red and white. The bulked pollen was transferred to the female parent and the resulting F₁ seed was collected and germinated. In 1997, from the flowering progeny, plants identified as 2245B and 2257B were selected. The F₁ generation yielded a variety of flower colors including lilac, cherry red, and purple. Foliage colors included green to dark green. The majority of the F₁ plants were sterile and it was not possible to recover seed from self pollination or backcrossing.

Methods for overcoming interspecific hybrid sterility barriers are known in the art and include, but are not limited to, colchicine treatments, random assortive mating and naturally developing pollen fertility.

The trailing interspecific *impatiens* plants of the present invention are genetically stable and can be stably reproduced by means of asexual propagation. Cuttings for asexual propagation can be taken at any time of the year and no special hormones or soil mixtures are required. It is expected that any trailing interspecific *impatiens* can be produced commercially through asexual propagation.

Using the methods described herein, it is expected that the trailing trait from *Impatiens flaccida* can be bred into diverse New Guinea (*Impatiens Hawkeri*) *impatiens* backgrounds, including those having many different flower colors, as well as bicolor flowers. Additionally, the trailing habit can be incorporated into New Guinea *impatiens* having solid green foliage, green and yellow variegated foliage, dark green foliage, dark purplish leaves, dark purplish and cream variegated foliage, etc.

The following examples are set forth as representations of specific and preferred embodiments of the present invention. These examples are not to be construed as limiting the scope of the invention in any manner. It should be understood that many variations and modifications can be made while remaining within the spirit and scope of the invention.

Example 1: Description of *Impatiens flaccida* x *Impatiens Hawkeri* hybrid named 2245B

The color chart used in the identification of colors described herein is the R.H.S. Colour Chart of The Royal Horticultural Society, London, England. The color values were determined on October 8, 1999 in West Chicago, IL. The readings were taken between 1:00 and 1:45 p.m. under approximately 2500 footcandles of light.

The plants were produced from cuttings taken from stock plants and were grown under greenhouse conditions comparable to those used in commercial practice while utilizing a soilless growth medium and maintaining temperatures of approximately 72 °F during the day and approximately 65 °F during the night.

Propagation

Type cutting	Terminal tip
Time to initiate roots	Approximately 14-21 days with the shorter times generally being experienced in the summer and the longer times in the winter
Rooting habit	Fibrous, branching

Plant Description

General appearance and form	Trailing
Crop time	A finished flowering plant is produced 8 to 10 weeks after planting rooted cuttings
Branching habit	Freely basal branching without pinching or growth regulators

	Total number of branches	Approximately 55 equal to or longer than 5 mm
	Branch length	Approximately 19.3 cm
	Branch diameter	Approximately 8 mm
	Internode length	Approximately 4.5 cm
5	Stem color	Yellow-Green Group 144D overlaid with Greyed-Purple Group 183B at nodes
	Height of foliage	A mature plant commonly measures approximately 17 cm above a 20 cm pot
	Length of foliage	Approximately 17 cm below top of a 20 cm pot
10	Area of spread	Approximately 45 cm with three plants per 20 cm pot

Foliage Description

	Form	Ovate with acuminate apex and cuneate base
15	Margin	Serrate, ciliate
	Arrangement	Opposite
	Venation pattern	Arcuate
	Surface	Smooth
20	Color of mature foliage-upper surface	Between Green Group 137A and Green Group 146A with veins of Yellow-Green Group 145C
	Color of mature foliage-lower surface	Closest to Green Group 138B with veins of Yellow-Green Group 144C
	Size	Approximately 6.3 cm in length; approximately 2.4 cm in width
25	Petiole length	1.1 cm
	Petiole diameter	2 mm
	Petiole color	Yellow-Green Group 145C with faint overlay of Red Group 52B at base

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Flower Description

Flowering habit

Freely flowering under outdoor growing conditions with substantially continuous blooming from spring until fall

5 Flowers borne

Above foliage arising from leaf axils

Peduncle length

4.9 cm

Peduncle color

Yellow-Green Group 145C with slight overlay of Red-Group 52B on lower third.

Flower form

Single

10 Quantity of flowers

Approximately 26 per plant

Flower size

Approximately 4.6 cm in diameter

Number of petals

Five

Petal texture

Iridescent

Petal shape

Obovate

15 Petal margin

Entire

Petal apex

Superior petal is flat; other four petals are emarginate

Petal base

Superior petal has very broad base; other petals have narrow, pointed base

20 Petal length

Superior petal is 1.8 cm; other four petals are 2.6 cm

Petal width

Superior petal is 2.4 cm; other four petals are 2.1 cm

Flower color

The upper surface of all petals is between Red-Purple Group 64A and Red-Purple Group 74A.

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The two lateral petals have bases of Red-Purple Group 72B; and the lowest two petals have bases of Red-Purple Group 72B with areas of Red-Purple Group 60A just above the bases forming an "eye". The lower surface of all petals is closest to Red-Purple Group 67A.

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Ovate

1.7 cm

8.3 mm

Closest to Red-Purple Group 71B

Three sepals plus two rudimentary sepals are fused into the under surface of the superior petal. A spur originating from the base of the inferior sepal is approximately 5.5 cm in length on fully opened flowers. The spur color is Red-Purple Group 58A with Yellow-Green Group 144C at tip.

Reproductive organs

The stamens and anthers are fused together forming one organ that surrounds the pistil. The pistil is approximately 5 mm long, the stigma color is Yellow-Green Group 144D, and the ovary color is Yellow-Green Group 144A. Generally, the anthers shed pollen prior to the stigma becoming receptive. The pollen color is Yellow Group 13D.

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Example 2: Description of *Impatiens flaccida* x *Impatiens Hawkeri* hybrid named 2257B

The color chart used in the identification of colors described herein is the R.H.S. Colour Chart of The Royal Horticultural Society, London, England. The color values were determined on October 8, 1999 in West Chicago, IL. The readings were taken between 1:00 and 1:45 p.m. under approximately 2500 footcandles of light.

The plants were produced from cuttings taken from stock plants and were grown under greenhouse conditions comparable to those used in commercial practice while utilizing a soilless growth medium and maintaining temperatures of approximately 72 °F during the day and approximately 65 °F during the night.

Propagation

Type cutting

Terminal tip

Time to initiate roots

Approximately 14-21 days with the shorter times generally being experienced in the summer and the longer times in the winter

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Rooting habit

Fibrous, branching

Plant Description

General appearance and form

Medium trailing

10 Crop time

A finished flowering plant is produced in 8 to 10 weeks after planting rooted cuttings

Branching habit

Freely basal branching without pinching or growth regulators

Total number of branches

Approximately 51 equal to or longer than 5 mm

15 Branch length

Approximately 21.3 cm

Branch diameter

Approximately 7 mm

Internode length

Approximately 5.1 cm

Stem color

Greyed-Purple Group 184A at base and above each node; Yellow-Green Group 144A just below each node

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Height of foliage

A mature plant commonly measures approximately 19 cm above a 20 cm pot

Length of foliage

Approximately 15 cm below top of a 20 cm pot

Area of spread

Approximately 46 cm with three plants per 20 cm pot

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Foliage Description

Form

Lanceolate with acuminate apex and cuneate base

Margin

Serrate, ciliate

30 Arrangement

Whorles of three

	Venation pattern	Arcuate
	Surface	Smooth
	Color of mature foliage-upper surface	Between Green Group 137A and Green Group 146A with veins of Yellow-Green Group 145C
5	Color of mature foliage-lower surface	Closest to Green Group 138B with veins of Yellow-Green Group 144C
	Size	Approximately 6.3 cm in length; approximately 1.9 cm in width
	Petiole length	9 mm
10	Petiole diameter	2 mm
	Petiole color	Yellow-Green Group 145C with faint overlay of Red Group 52B at base
	Flower Description	
15	Flowering habit	Freely flowering under outdoor growing conditions with substantially continuous blooming from spring until fall
	Flowers borne	Above foliage arising from leaf axils
	Peduncle length	5.4 cm
20	Peduncle color	Yellow-Green Group 145C with slight overlay of Red-Purple Group 60B
	Flower form	Single
	Quantity of flowers	Approximately 23 per plant
	Flower size	Approximately 4.4 cm in diameter
25	Number of petals	Five
	Petal texture	Iridescent
	Petal shape	Obovate
	Petal margin	Mostly entire with some incisions
30	Petal apex	Superior petal has rounded tip; other four petals are emarginate

	Petal base	Superior petal has very broad base; other petals have narrow, pointed base
	Petal length	Superior petal is 1.7 cm; other four petals are 2.3 cm
5	Petal width	Superior petal is 2.5 cm; other four petals are 2.1 cm
	Flower color	The upper surface of the superior petal is between Purple-Violet Group 81C and Purple-Violet Group 81D. The two lateral petals are between Purple-Violet Group 81B and Purple-Violet Group 81C; and the lowest two petals are closest to Purple-Violet Group 81C with areas of Red-Purple Group 60A just above the bases forming an "eye". Lower surface of all petals is Violet Group 84A with midvein of Violet Group 84B.
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15	Flower bud shape	Ovate
	Flower bud length	1.9 cm
	Flower bud diameter	1.2 cm
	Flower bud color	Violet Group 84B
20	Sepals	Three sepals plus two rudimentary sepals are fused into the under surface of the superior petal. A spur originating from the base of the inferior sepal is approximately 4.4 cm in length on fully opened flowers. The spur color is Red Group 49D at proximal end; Red Group 54C in the middle three-quarters; Yellow-Green Group 144C at tip.
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	Reproductive organs	The stamens and anthers are fused together forming one organ that surrounds the pistil. The pistil is approximately 5 mm long, the stigma color is Yellow-Green Group 144C and the anther color is Yellow-Green Group 144C.
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is Yellow-Green Group 144A. Generally, the anthers shed pollen prior to the stigma becoming receptive. The pollen color is Yellow Group 13D.

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Deposit Information

Two thousand five hundred (2500) seeds of *Impatiens flaccida* have been placed on deposit with the American Type Culture Collection (ATCC), 10801 University Blvd., Manassas, Virginia, 20110-2209 under Deposit Accession Number _____ on December 14, 1999. This deposit was made in compliance with the Budapest Treaty requirements that the duration of the deposit should be for thirty (30) years from the date of the deposit or for five (5) years after the last request for the deposit at the depository or for the enforceable life of a U.S. Patent that matures from this application, whichever is longer. These impatiens seeds will be replenished should it become non-viable at the depository.

The present invention is illustrated by way of the foregoing description and examples. The foregoing description is intended as a non-limiting illustration, since many variations will become apparent to those skilled in the art in view thereof. It is intended that all such variations within the scope and spirit of the appended claims be embraced thereby.

Changes can be made to the composition, operation and arrangement of the method of the present invention described herein without departing from the concept and scope of the invention as defined in the following claims.